

# EXHIBIT 1

Oct. 13, 1931.

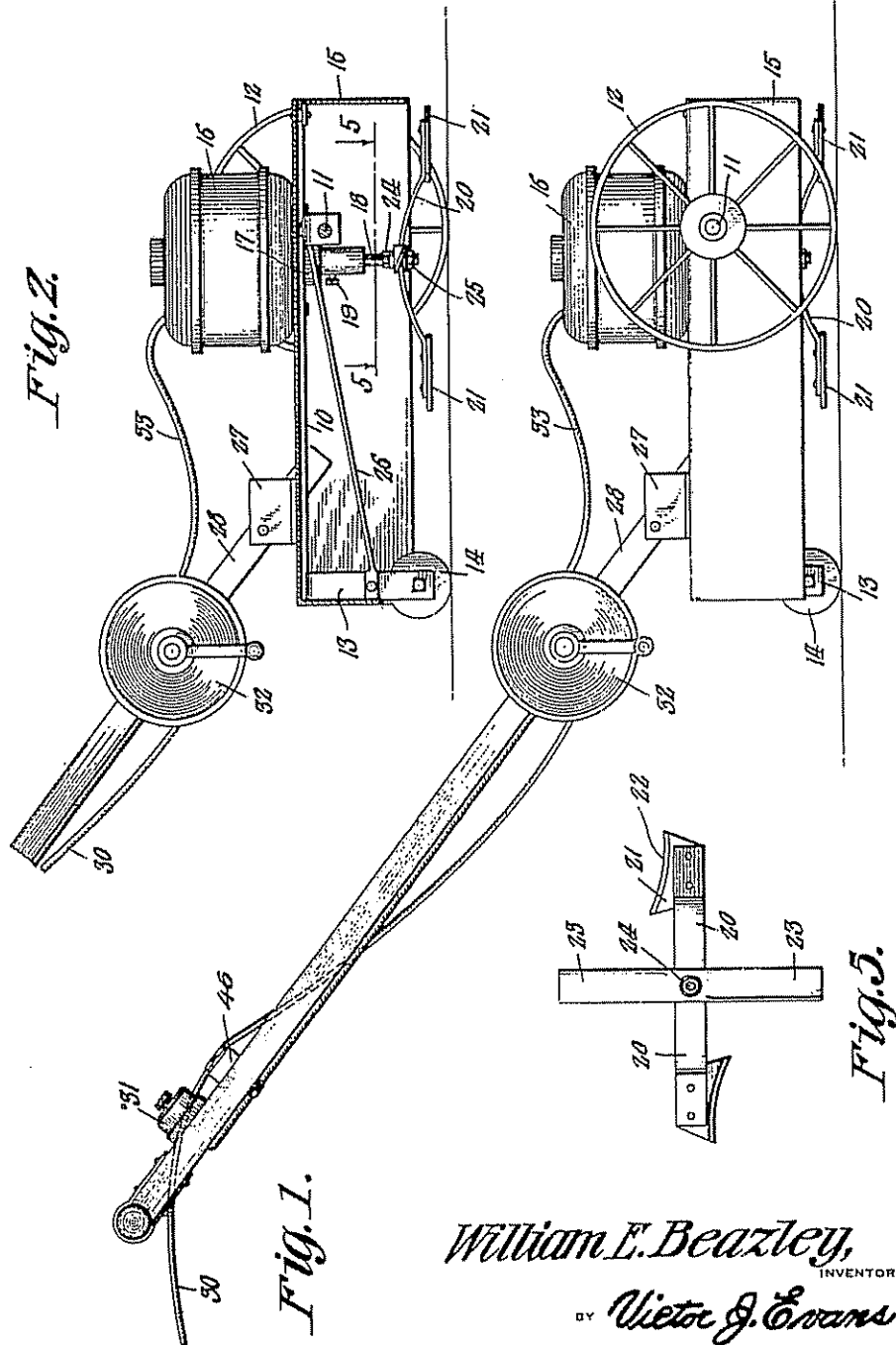
W. E. BEAZLEY

1,827,559

POWER OPERATED LAWN MOWER

Filed June 15, 1929

3 Sheets-Sheet 1



William E. Beazley,

INVENTOR

by Victor J. Evans

ATTORNEY

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POWER OPERATED LAWN MOWER

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3 Sheets-Sheet 2

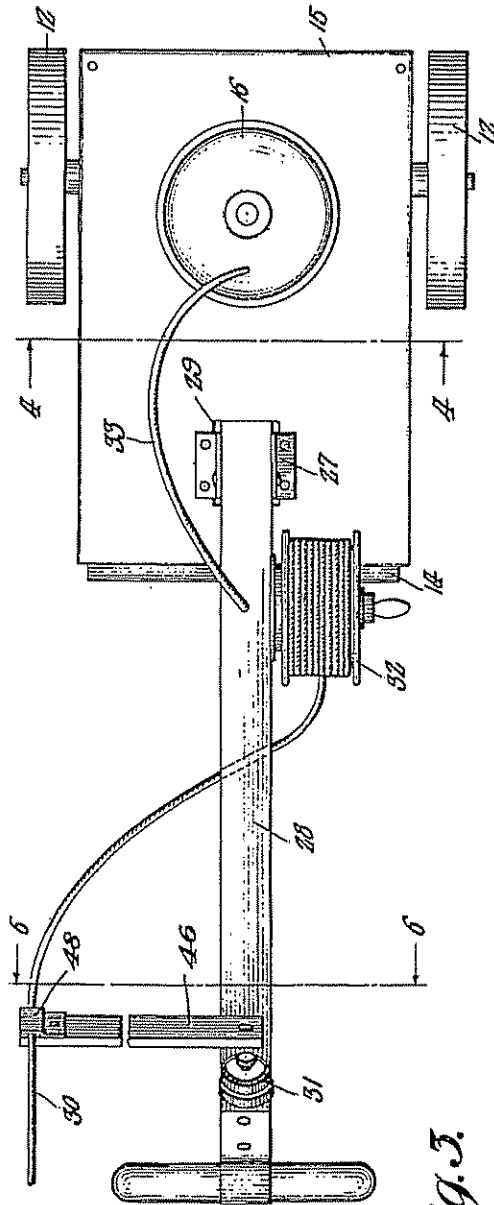


Fig. 3.

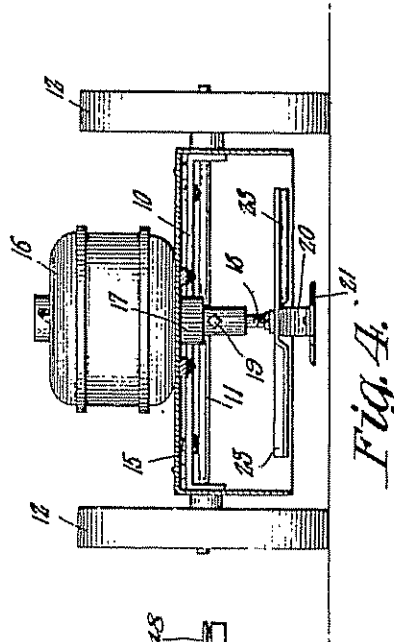
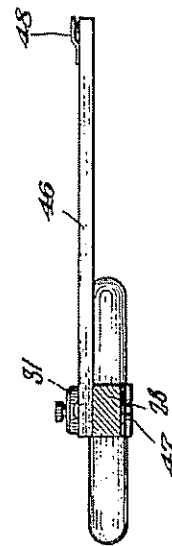


Fig. 4.

Fig. 6.



William E. Beazley,

INVENTOR

BY Victor J. Evans

ATTORNEY

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W. E. BEAZLEY

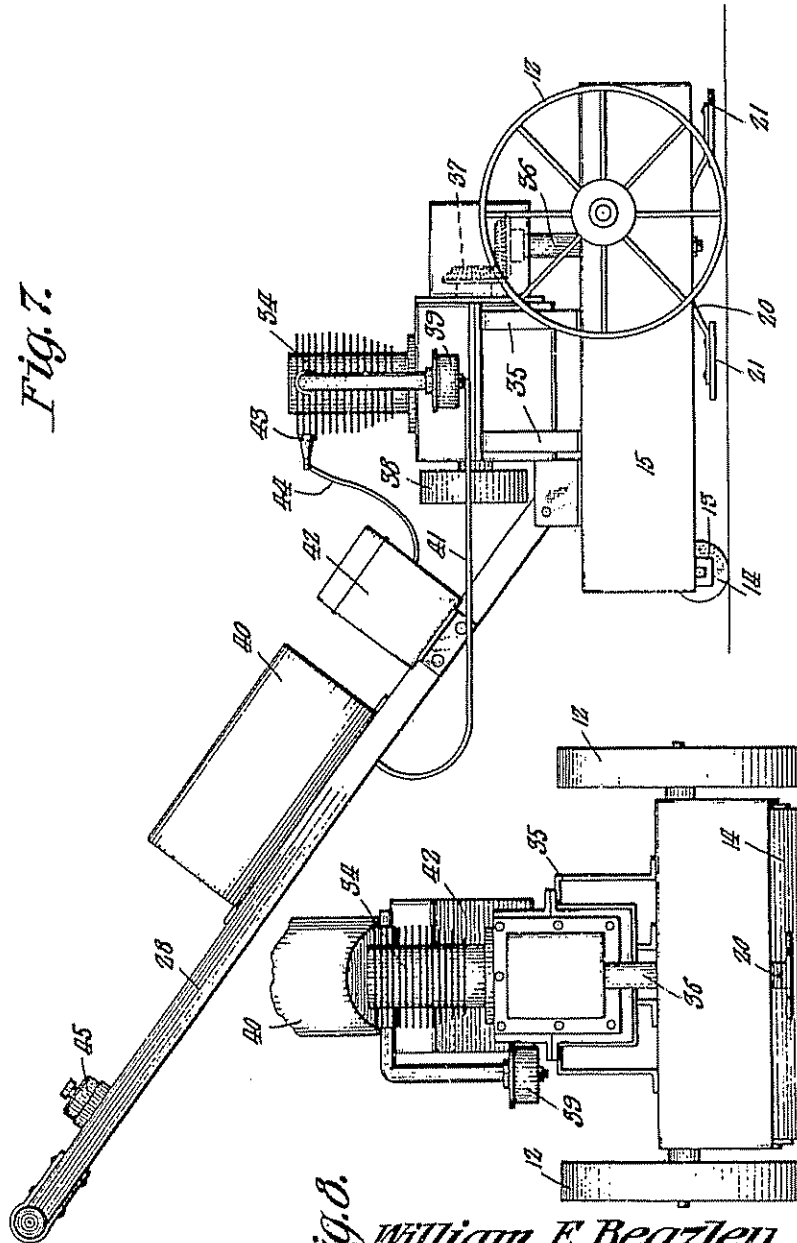
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*Fig. 7.*



*Fig. 8.*

William E. Beazley,  
INVENTOR

BY Victor J. Evans  
ATTORNEY

Patented Oct. 13, 1931

1,827,559

## UNITED STATES PATENT OFFICE

WILLIAM E. BEAZLEY, OF ST. PETERSBURG, FLORIDA, ASSIGNOR TO BEAZLEY POWER MOWER CO. (INCORPORATED), OF ST. PETERSBURG, FLORIDA

POWER OPERATED LAWN MOWER

REISSUED

Application filed June 15, 1920. Serial No. 371,232.

This invention relates to lawn mowers and has for an object the provision of a simple, efficient and easily handled power driven mower which may be operated at a low cost.

Another object of the invention is the provision of a mower having means for holding the blades of grass and other vegetation in an erect position to be acted upon by the cutting blades of the mower, so that the grass will be cut to a uniform height.

Another object of the invention is the provision of means for adjusting the cutters to regulate the height of the cut.

Another object of the invention is the provision of means for rolling the lawn simultaneously with the cutting operation and utilizing the weight of the mower and the means for operating the cutters to provide weight for the roller.

With the above and other objects in view, the invention further includes the following novel features and details of construction, to be hereinafter more fully described, illustrated in the accompanying drawings and pointed out in the appended claim.

In the drawings:—

Figure 1 is a side elevation of a lawn mower constructed in accordance with the invention.

Figure 2 is a longitudinal sectional view.

Figure 3 is a top plan view.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a detail section on the line 5—5 of Figure 2.

Figure 6 is a section on the line 6—6 of Figure 3.

Figure 7 is a side view showing a slightly different form of the invention.

Figure 8 is a front view of the mower shown in Figure 7.

Referring to the drawings in detail where-like characters of reference denote corresponding parts, the mower as shown comprises a frame 10 which is mounted upon

an axle 11, and this axle is supported by wheels 12, so that the frame 10 will be wheel supported. The axle 11 is located adjacent one end of the frame, while the opposite end of the frame includes depending arms 13 between which is mounted a roller 14. This roller is designed for the purpose of rolling and leveling the lawn and has added thereto the weight of the mower and the mower operating means.

The frame 10 is enclosed within a housing 15 and mounted upon this housing is an electric motor 16. The shaft of this motor extends downward within the housing through a suitable bearing 17 and this shaft is hollow and has secured therein an extension 18. The shaft extension 18 is held in place by a binding screw 19.

Mounted upon the extension 18 of the motor shaft are oppositely extending arms 20. These arms have secured to their outer ends cutting blades 21 which are horizontally disposed and which have their cutting edges curved as at 22.

It will be apparent that when the motor is operated the arms 20 will be rotated so that the blades will be operated to cut the grass or other vegetation. Due to the curved cutting edges of the blades a shearing action will be provided.

Also extending from the shaft extension 18 are oppositely disposed fan blades 23. These blades are mounted on a plane above the cutting blades 21 and provide suction means to draw the grass blades or other vegetation upward so as to hold the same erect and materially assist in the cutting operation. The grass will thus be cut to a uniform height instead of being pushed down and passed over by the blades 21. As the fan blades 23 are within the housing 15, an effective suction will be provided for raising the grass.

The blades 20 and 23 may be vertically adjusted upon the shaft extension 18 through the medium of adjusting nuts 24 and 25. The

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arms 13 between which the roller 14 is mounted are connected with the axle 11 by means of brace rods 26.

Pivotally mounted upon the housing 15 between spaced ears 27 is a handle 28. This handle extends downward through a slot 29 provided in the housing so that it may be tilted upward if desired.

In order to supply current for the motor there is provided a cable 30 which may be connected with a suitable source of current. This cable is connected with a controlling switch 31 which is mounted upon the handle 28 and is wound upon a reel 32 so as to permit the mower to be moved over a relatively large area. Suitable connection 33 is provided between the reel and the motor 16.

If desired, the mower may be operated through the medium of an internal combustion engine as shown at 34 in Figures 7 and 8 of the drawings. This engine is mounted in a saddle or frame 35 which rises from the housing 15 and the power shaft of the engine drives a vertically disposed shaft 36 through the medium of gears 37. The arms 20 and 23 are mounted upon this shaft 36.

The fly wheel of the engine is indicated at 38 while the carburetor is shown at 39 and fuel from this carburetor is supplied from a tank 40 which is mounted upon the handle 28, a fuel supply pipe 41 being provided for this purpose.

A suitable battery is contained within a battery box 42 which is also mounted upon the handle and current is supplied to the ignition device 43 of the engine through a cable 44. A switch 45 mounted upon the handle 28 controls the ignition.

In the first described form of the invention where current for the operation of the mower is supplied through a cable 30, means are provided for keeping the cable out of the way of the wheels. This arm which is indicated at 46 is pivotally and adjustably secured to the handle 28 by means of a bolt 47, so that it may be swung laterally to either side of the handle. The outer end of this arm carries a spring clip 48 which is adapted to yieldingly grip the cable 30. The cable may thus be held in position at either side of the handle 28 to prevent entanglement with the wheels of the mower and to clear shrubs, trees and other obstructions.

The invention is susceptible of various changes in its form, proportions and minor details of construction and the right is herein reserved to make such changes as properly fall within the scope of the appended claim.

Having thus described the invention what is claimed is:—

A power operated lawn mower comprising a portable carriage, a power source carried by the carriage, a shaft driven by the power source and depending therefrom under the carriage, oppositely disposed and downward-

ly curved arms having the inner ends thereof adjustably secured to the shaft, cutting blades secured to the arms adjacent the free ends thereof and having curved cutting edges disposed laterally of the arms, and oppositely disposed fan blades adjustably secured to the shaft above the cutting blades to create a suction to the uncut grass to draw the grass into the path of rotation of the cutting blades.

In testimony whereof I affix my signature.

WILLIAM E. BEAZLEY.

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# EXHIBIT 2

Nov. 16, 1926.

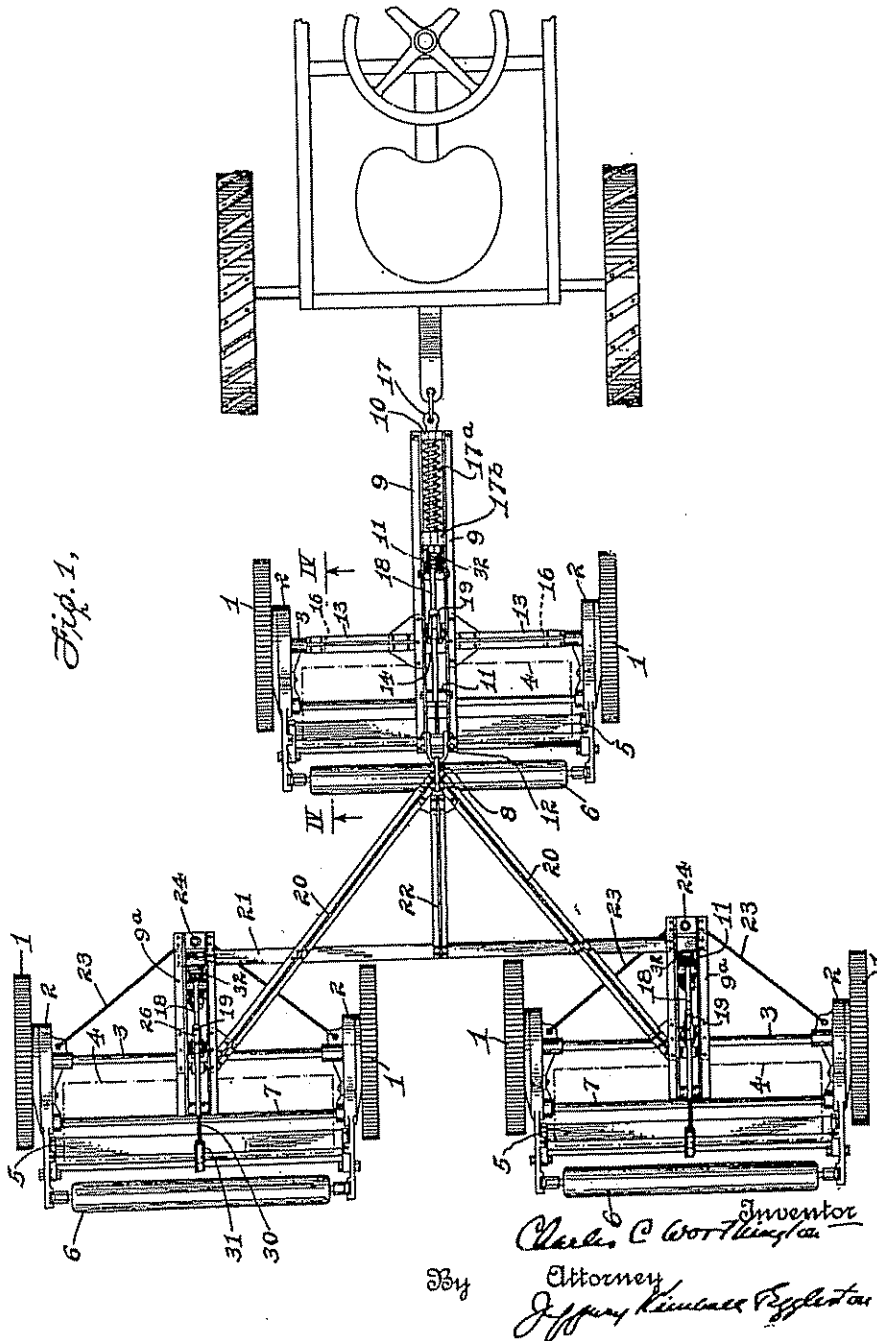
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C. C. WORTHINGTON

GANG LAWN MOWER

Filed May 13, 1920

3 Sheets-Sheet 1





Nov. 16, 1926.

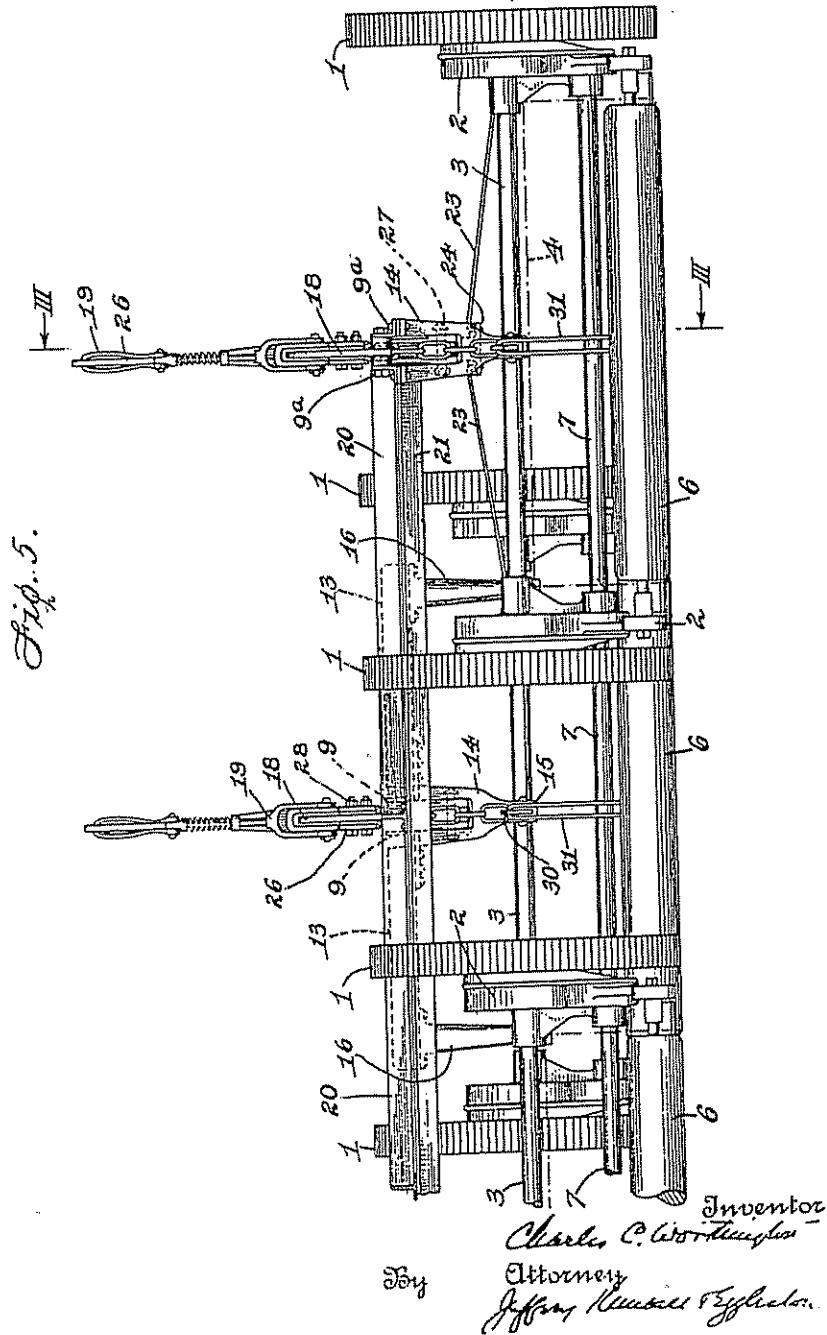
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C. C. WORTHINGTON

GANG LAWN MOWER

Filed May 13, 1920

3 Sheets-Sheet 2



Nov. 16, 1926.

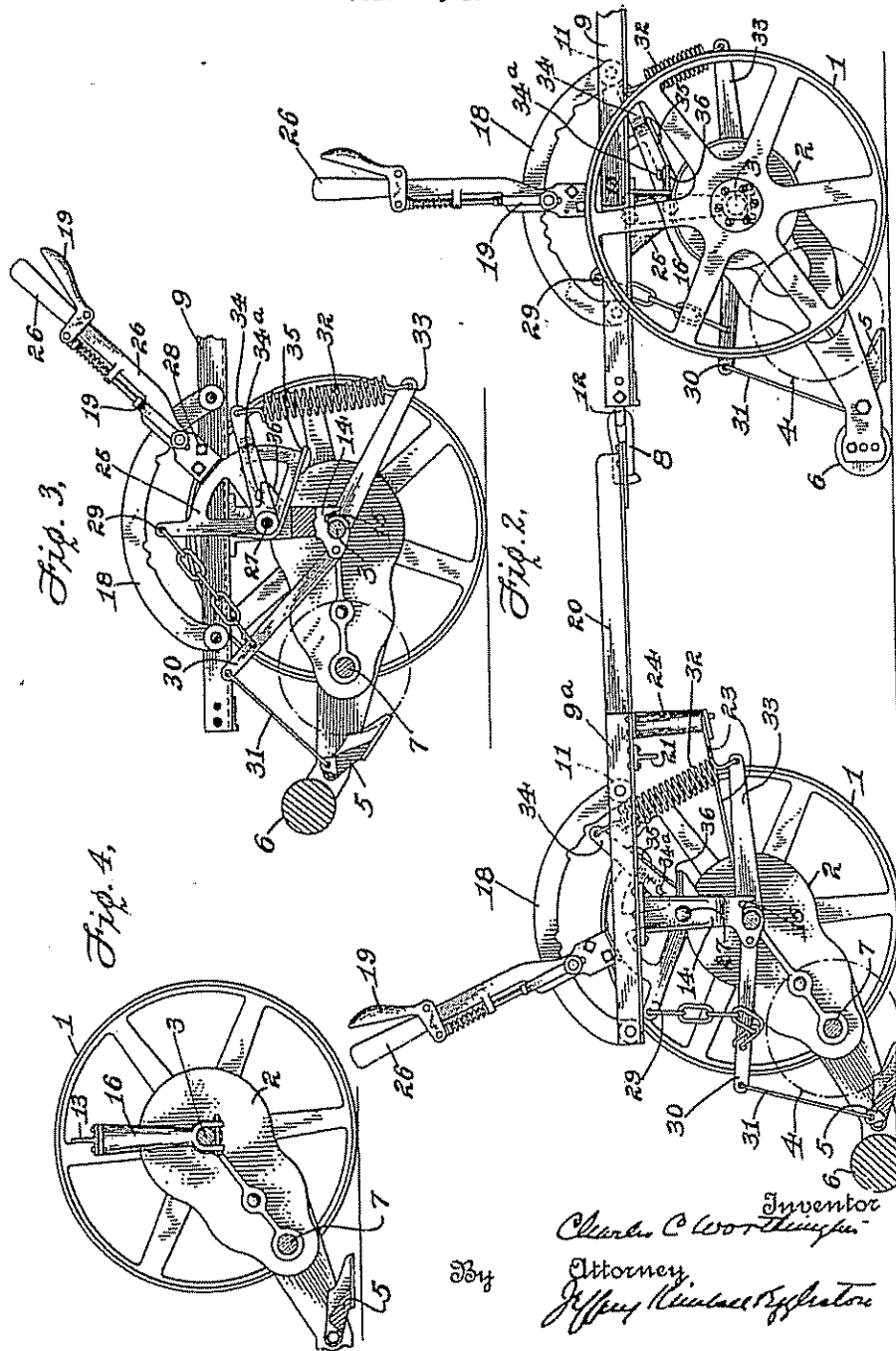
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C. C. WORTHINGTON

GANG LAWN MOWER

Filed May 13, 1920

3 Sheets-Sheet 3



Inventor  
Charles C. Worthington  
Attorney  
Jeffrey Kimball & Co.

Patented Nov. 16, 1926.

1,607,378

## UNITED STATES PATENT OFFICE.

CHARLES C. WORTHINGTON, OF DUNNFIELD, NEW JERSEY.

GANG LAWN MOWER.

Application filed May 13, 1920. Serial No. 381,029.

The improvements refer to the structure of the gang frame by which the several lawn mower units are held in their spaced arrangement and permitted to accommodate the undulations of the ground and also to the means for adjusting the units to cut the grass with different heights of cut. The purposes of the invention are disclosed below in connection with the form of machine at present preferred as shown in the accompanying drawing, wherein—

Figure 1 is a plan view showing the gang mower drawn by a tractor;

Figure 2 a side elevation with the rear unit in section;

Figure 3 a section on line III—III of Figure 5 showing the cutter mechanism raised;

Figure 4 a detail of the front unit operating on line IV—IV of Figure 1, and Figure 5 is a partial rear elevation.

The three lawn mower units constituting the gang in the present case may be understood to represent a common or any suitable form of mower unit, each having a pair of ground wheels 1, side gear casings 2, and a cross rod 3 constituting the unit frame, a rotary cutter 4 appropriately driven by the ground wheels, and for convenience represented in dot and dash lines in the drawings, a bed knife 5, and a ground roller 6. The cutter reel shaft is marked 7. One unit is disposed in front and two in rear so that their swaths overlap and the main framework or gang frame is carried on the cross rods 3 of the frames of each of the three units. These cross rods coincide as usual with the axes of the ground wheels, although that is not necessary and the gang frame can be mounted on, over, or otherwise in association with the units in various ways according to the type and mode of operation of the unit employed. The gang frame is composed of front and rear sections connected by a detachable link 8 representing a universal joint which permits one section to turn and tilt in every direction with respect to the other and as demanded by the conditions of use. The front section comprises two longitudinal parallel channel bars or angle ends 9 bolted together with intervening spacers 10, 11 and 12 so as to form an open space between them to accommodate

the unit adjusting means presently described, and it also includes two lateral T-iron arms 13 extending parallel with and above the frame rod 3 of the unit. These arms are secured to the bars 9 by a central post casting 14 which is provided with flanges for the purpose and with the usual gussets as shown. This post member as shown more clearly in Figure 5 is divided at its upper end and directly below the open space between the angle bars 9, also for the purpose of accommodating the unit adjusting means, and at its lower end it is provided with an open slot 15 which embraces and may rest upon the middle of the frame rod 3. The two posts 16 bolted to the extreme ends of the T-iron arms 13 form the support of the front section on the unit, the lower ends of these posts being crotched for attachment to the frame rod 3 as indicated in Figure 4 and located near the side casings of the unit. Such an attachment permits the cutter mechanism at the rear end of the unit to be raised and lowered about the axis of the rod 3 as a center. When the mower is to be drawn by a tractor the forward end of the space between the angle bars 9 houses the draw bar 17 and also the spring 17<sup>a</sup> through which the draft on the latter is imparted to the whole machine. It will be noted that by reason of the short length of the supporting post 16 the front section of the gang frame occupies a plane wholly below and between the tops of the ground wheels so that the draft line is thus close to the level of the wheel axis. When the machine is horse drawn the shaft couplings are preferably attached directly to the ends of the T-iron arms 13 above the posts 16. The two spacers 11 and their respective bolts form the support for a notched arc plate 18 located centrally of and above the space between the angle bars 9 and serving as the fixed member to be engaged by the latch mechanism 19 of the unit adjusting means by which the cutter mechanism is raised and lowered.

The rear frame section is composed of two oblique T-iron bars 20 extending divergently rearward from the hook joint 8 to points near the centers of the two rear units, a cross bar 21 intersecting the oblique bars near their middle point and riveted to them.

and a tie bar 22 connecting the middle of the cross bar to the junction or apex of the oblique bars. The adjacent ends of the oblique bars and the cross bar are united by two parallel spaced angle bars 9<sup>a</sup> similar to the bars 9 above described and adapted in like manner to accommodate between them the adjusting means for their respective mower units. A divided center post 14, quite the same as that already described and bolted to the underside of each pair of bars 9<sup>a</sup>, forms the supporting connection between the rear frame section and the two rear units, the lower ends of these posts being provided with open slots or seats as before which rest upon the cross rods 3 at about their middles so that each unit is thus free to tilt vertically in the plane of its own wheel axis with reference to the gang frame. The rear units are further connected to the frame by the guy links 23, each constructed or otherwise connected to their side casings 2 and to a guy post 24 rigidly depending from the forward ends of the united bars 9<sup>a</sup>. These links maintain the lateral position of the units parallel with the cross bar 21 without interfering with their tilting or cutter lifting movement above mentioned. The divided posts 14 for the rear units maintain the rear frame section at the same level as the front section, i. e. below the tops of the ground wheels. It will be apparent that the rear units can not only tilt independently of each other but that the whole rear frame section can tilt independently of the front section and can also turn laterally with reference thereto as required when rounding corners. The pairs of spaced frame bars 9<sup>a</sup> each carry an arc plate 18 like that over the front unit and the unit adjusting means and hand lever mechanism is accommodated between the said pairs, this mechanism being the same for each unit of the gang. The hand lever of the unit adjusting mechanism is constituted of a sector-shaped part 25 and a handle part 26, which latter carries the latch 19 above mentioned. The sector part is fulcrumed on a pin 27 so that it may swing in the open space between the divided parts of the post 14, below the arc plate and within the space between the angle bars 9 or 9<sup>a</sup>, and the handle part 26 is forked to straddle said plate and embrace the sector, to which it is bolted by the bolts 28. The rear end or arm 29 of the sector is adapted to raise the cutter mechanism of the unit, being for this purpose connected by a chain to the strut link 30, which latter is pivoted to the foot of post 14 and connected at its free end by link 31 to the center of the bed knife 5, itself connected to the side frame members 2 which may be considered as constituting lever arms or a lever arm turning about the axis of a rod 3. When the handle 26 is thrust forward as indicated in Figure 3, the arm 29 and its chain and link connections just described raise the roller 6 and the cutter mechanism from the ground and hold it at an elevation determined by the notch in the arc plate to which the lever may be latched. When in this position as well as when lowered, the cutter mechanism is or may be pressed toward the ground by a spring 32 connected at one end to the end of an arm 33 fast to the mower unit, and at the other to a spring holder 34, which latter is pivoted on the same pivot (27) as the hand lever immediately adjacent to the sector part 25, but movable independently thereof. The said spring holder is adapted to be supported against the pull of the spring by the flange 35 on the sector, which flange is placed to engage it, or it may be supported by the fixed bracket part 36 projecting forwardly from the post 14 close to one side of the spring holder and adapted to support the latter by engaging its lug 34<sup>a</sup> laterally projecting therefrom (see Fig. 2). When the hand lever is thrust to the rear or so as to lower the cutter mechanism, the sector flange 35 encounters the lower side of the spring holder 34 and lifts it as shown in the rear unit of Figure 2 and thereby puts more or less tension on the spring and correspondingly pressing the cutter mechanism toward the ground. In this movement the spring holder is operated as though it were a lever arm fixed to the hand lever 26 and, considered as such, it is shorter in length than the arm 33, which condition contributes to the effects produced. Forward movement of the lever diminishes the spring tension up to the middle or neutral point, indicated in the front unit of Figure 2, where the tension has diminished to zero or to a minimum, and as the said movement is continued beyond the neutral point, as in Figure 3, it raises the cutter mechanism but without further moving or lowering the spring holder 34, which now rests by its lug 34<sup>a</sup> upon the bracket 36. As the cutter mechanism rises the downward swing of the arm 33 puts the spring again under tension so that the cutter mechanism is urged toward the ground, although now in its raised position. In this position the unit is adjusted for making a high cut of the grass, being aided thereto by spring pressure which holds its cutter mechanism to its work. Thus the single operating means serves for adjustably varying the spring tension when the roller 6 is on the ground and for raising the roller to adjust the height of cut and also causes a suitable downward pressure to be exerted when the cutter is raised.

It will be noted that the gang frame is Y-shaped the point of pivotal and preferably of universal connection between the stem section and the arm section being located in the plane of the stem section, which plane



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in the illustrated construction is also the central longitudinal plane of a front unit.

It will be obvious that the front unit is normally supported in horizontal position by the draft mechanism, whether that be a draw-bar or horse shafts, and in the latter case that a driver's seat may, if desired, be mounted on the gang frame, preferably on the rear section thereof, in which position he will be able to reach all the hand levers, and further that various of the features herein disclosed may be used independently of the others and within this invention, it being obvious for example, that the arrangement of the frame members is quite as useful with bearing posts of greater length than shown and that the features of the adjusting mechanism as described, can be incorporated in various styles of single and gang frames, and further, that various changes in the proportions and relative arrangement of the parts described as well as additions thereto and subtractions therefrom may be resorted to without sacrificing the results of this invention or departing from the principle thereof as now fully disclosed.

The spring-yielding draw bar 17 described above as housed between the forward ends of the frame members 9, slides in a hole in the front spacer 10, and its rear end is attached to a cross-head 17<sup>b</sup> which slides on and is confined to the members 9, the spring 17<sup>a</sup> being interposed between the spaces and cross-head and thus concealed and protected by the framework. The intervention of such a spring or equivalent yielding connection in the line of the draft-pull between the tractor and the mower removes a serious objection to the use of motor vehicles for drawing gang mowers over a lawn, and constitutes an important and independent feature, which, however, is disclosed and claimed in a companion application, Serial No. 471,130, filed May 20, 1921.

Claims:

1. In a gang lawn mower, a gang of lawn mower units each having ground wheels, a gang frame formed of front and rear sections both located below the level of the wheel tops and having below the said level a universal joint between them and connecting said units in the spaces between their ground wheels, the draft strain being transmitted through frame members located around and between and below the tops of the driving ground wheels of the units.

2. In a gang lawn mower, a gang of lawn mower units having ground wheels, a gang frame formed of front and rear pivotally connected frame sections, the front section being supported on a front unit and the rear section comprising rearwardly divergent frame members extending from the pivotal connection to positions adjacent the centers of the two rear units, and a pivotal connec-

tion between said rear section and each rear unit permitting each unit to tilt in the plane of its own wheel axis.

3. In a gang lawn mower, a gang of lawn mower units each having ground wheels and a gang frame serving to unite and space a plurality of said units and including two angularly divergent frame members each connected to a different unit.

4. In a gang lawn mower, a gang of lawn mower units each having ground wheels and a gang frame including two divergently located frame members and a cross member whose remote ends are connected to different mower units between their ground wheels intersecting the said members and secured thereto.

5. In a gang lawn mower, a gang of mower units and a gang frame including two horizontal divergent frame members, a cross member intersecting the same and secured thereto, and post members connected with the adjacent ends of said divergent and cross members and constituting means for supporting said members upon the lawn mower units.

6. In a gang lawn mower, a gang of lawn mower units, a gang frame comprising frame members and a divided post member forming the connection between said members and a mower unit, and unit adjusting mechanism occupying the space between the divided parts of said post member.

7. In a gang lawn mower, a gang of lawn mower units, a gang frame supported thereon and comprising post members constituting the means whereby said frame is supported on the units, closely spaced frame members providing narrow open spaces directly over said post members, and unit adjusting mechanism accommodated in said spaces and located over the post members.

8. In a gang lawn mower, a lawn mower unit having its cutter mechanism provided with lever arms, an operating member having a lever arm connected to one of the arms of the cutter mechanism, a pivoted holder arm operatively connected to said operating member, and a spring for pressing said cutter mechanism to the ground connecting said holder arm and the other arm of the cutter mechanism, the arm lengths being so related as to give the cutter-mechanism-connected end of the spring greater movement than the holder-arm-connected end when the cutter mechanism is raised.

9. In a gang lawn mower, a lawn mower unit, a spring pressing its cutter mechanism toward the ground, a movable spring holder and means movable independently of said holder for raising the cutter mechanism from the ground.

10. In a gang lawn mower, a lawn mower unit having a spring for pressing its cutter mechanism toward the ground; a spring

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holder and an operating member engageable with and disengageable from said spring holder and movable in one direction for lowering said cutter mechanism and having means adapting it by said movement to move into engagement with and operate said holder to increase the tension of the spring.

11. In a gang lawn mower, a lawn mower unit having a spring for pressing its cutter mechanism toward the ground, a unit adjusting mechanism comprising a hand-operated lever arm, a cutter raising arm, and an independently movable spring holder.

12. In a gang lawn mower, a lawn mower unit having an operating member for raising and lowering its cutter mechanism and comprising a cutter raising arm, a pivoted strut link connected to and operated by said arm and a cutter lifting connection between said link and the cutter mechanism.

13. In a gang lawn mower, a lawn mower unit, an operating member for raising and lowering its cutter mechanism, a spring acting to press said mechanism toward the ground both in its raised and lowered position, and a movable spring holder, said operating member being movable independently of said holder.

14. In a gang lawn mower, a gang of lawn mower units having ground wheels, a gang frame formed of a front section connected to a front unit, and a rear section pivoted to said front section and having rearwardly divergent members each connected to a rear mower unit between its ground wheels.

15. In a gang lawn mower, a gang of lawn mower units each having ground wheels, and a gang frame formed of front and rear sections pivotally connected, one of said frame sections being placed over one or more of said mower units, and the other of said frame sections being supported on a plurality of said other mower units between their respective ground wheels, members constituting part of the latter frame section extending obliquely from adjacent the pivotal connection of the frame sections to adjacent the respective points of support.

16. A gang lawn mower comprising a lone front lawn mower unit and rear lawn mower units each having ground wheels and a gang frame symmetrical with respect to the central longitudinal vertical plane of the mower and having a front section mounted on the front unit between its ground wheels, and a rear section having at its front end a universal connection to the front section in the said plane and having members diverging from said plane rearwardly to the spaces between the ground wheels of the respective rear units on which they are mounted, the several mower units having capability of tilting in the planes of their respective axes.

17. In a gang lawn mower, a gang of mower units each having driving ground

wheels, and a Y-shaped gang frame serving to unite and space a plurality of said units and having a stem section located in the central vertical plane of the mower and an arm section joined thereto adjacent the apex of the Y arms by a universal joint in the said plane, the arm section being a braced skeleton structure.

18. In a gang lawn mower, a gang of mower units, a skeleton gang frame section mounted on units of the gang and having members relatively divergent from a meeting point and having at their remote ends posts each mounted on a different unit, and unit adjusting mechanism mounted on said frame adjacent said ends.

19. In a gang lawn mower, a gang of mower units, and a skeleton gang frame section spacing units of the gang and having a central member and side members all relatively divergent from a meeting point and a brace member intersecting the relatively divergent members.

20. In a gang lawn mower, a gang of lawn mower units each having ground wheels, a substantially horizontal gang frame having front and rear sections, the front section mounted on the front unit and extending in the central vertical plane of said unit and in the line of draft and the rear section having a universal connection in the said plane with the rear of the front section and having side members and an intermediate member relatively diverging from the point of universal connection, the intermediate member being in prolongation of the front section and means in rear of their meeting point for connecting and bracing said members.

21. In a gang lawn mower, a gang of lawn mower units each having ground wheels, a gang frame having pivotally connected front and rear sections spacing said units each frame section having a pair of spaced members corresponding to each unit over which it is mounted and located in vertical planes at right angles to the respective unit axes, and unit adjusting mechanism for each unit comprising a hand lever whose operating arm plays in the space between the pair of spaced members corresponding to that unit.

22. In a gang lawn mower, a gang of lawn mower units having ground wheels, a gang frame formed of front and rear pivotally connected frame sections, the front section being connected to a front unit and the rear section comprising rearwardly divergent frame members extending from the pivotal connection to positions adjacent the centers of two rear units, and a pivotal connection between said rear section and each rear unit permitting each unit to tilt in the plane of its own wheel axis.

23. In a gang lawn mower, a gang of lawn

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mower units each having ground wheels and a gang frame serving to unite and space a plurality of said units and comprising two pivotally connected sections one of which includes two angularly divergent frame members each connected to a different unit.

24. In a gang lawn mower, a gang of mower units, and a Y-shaped gang frame serving to unite and space a plurality of said units and having a stem section and an arm section joined to the stem section adjacent the apex of the Y arms by a universal joint in the plane of the stem section.

25. In a gang lawn mower, a gang of mower units, and a Y-shaped gang frame serving to unite and space a plurality of said units and having a stem section and an arm section pivoted to the stem section adjacent the apex of the Y arms.

26. In a gang lawn mower, a gang of mower units, and a Y shaped gang frame serving to unite and space a plurality of said units and having a stem section mounted over the front mower unit and an arm section pivoted to the stem section adjacent the apex of the Y arms, and a pivotal connection between the other end of each Y arm and a rear mower unit permitting each such unit to tilt in the plane of its own wheel axis.

27. In a gang lawn mower, a gang of lawn mower units each having ground wheels, a gang frame supported by the mower units and formed of flexibly connected front and rear sections, both located below the level of the wheel tops and connecting said units in the spaces between their ground wheels, the draft strain being transmitted through frame members located around and between and below the tops of the driving ground wheels of the units, said spacing and uniting structure flexibly keeping the wheel axes of the respective units always square to the direction of travel but permitting the units to tilt in the planes of their respective ground wheel axes.

28. In a gang lawn mower having a gang of lawn mower units each having ground wheels, the combination of a gang frame supported by said ground wheels and whose principal draft members are situated below the level of the wheel tops and between the same, said frame having rigid post members depending from the frame in front of certain of said units, flexible draft connections between said members and said respective units adapted to keep the units with their wheel axes always at right angles to the longitudinal frame axis but each free to tilt in the plane of its own wheel axis.

29. In a gang lawn mower, a gang of lawn mower units having ground wheels, a gang frame formed of flexibly connected front and rear sections whose principal members are situated below the level of the wheel tops

and connect the units in the spaces between their ground wheels; one of said frame sections having closely spaced fore and aft frame members located in the central longitudinal planes of the respective units connected thereto, and cutter adjusting means for said units comprising hand levers pivoted below the spaced frame members of the corresponding unit.

30. In a gang lawn mower, a gang of lawn mower units each having ground wheels, a gang frame, the principal draft members of which are located below the level of the wheel tops, connecting said units in the spaces between their ground wheels, the draft strain being transmitted through frame members located around and between and below the tops of the driving ground wheels of the units, an operating member for each lawn mower unit for raising and lowering its cutter mechanism, and a bodily movable spring associated with said cutter mechanism, acting to press said mechanism toward the ground and being under tension when the cutter is elevated.

31. In a gang lawn mower, a gang of lawn mower units each having ground wheels, and a gang frame supported by said ground wheels and whose principal draft members are located below the level of the wheel tops, connecting said units in the spaces between their ground wheels, the draft strain being transmitted through frame members located around and between and below the tops of the driving ground wheels of the units, each unit comprising adjustable cutter mechanism and an adjustable handle operatively associated with and mounted over the cutter mechanism of each individual unit.

32. In a gang lawn mower, a gang of lawn mower units each having ground wheels and arranged with one unit in front and two in rear connected by a gang frame the principal draft members of which are located below the level of the wheel tops and which is formed of front and rear sections having a universal joint between them and connecting said units in spaces between their ground wheels.

33. In a gang lawn mower, a gang of lawn mower units each having ground wheels, cutter mechanism, means for raising and lowering said cutter mechanism and a spring associated with said cutter mechanism to press it toward the ground, the gang being arranged with one unit in front and two in rear connected by a gang frame the principal draft members of which are located below the level of the wheel tops and which is formed of front and rear sections having a universal joint between them and connecting said units in spaces between their ground wheels.

34. In a gang lawn mower, a lawn mower unit, means for raising and lowering its cut-



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ter mechanism, a spring connected to the cutter mechanism, a movable spring holder, a stop therefor, and means associated with the cutter raising and lowering means for engaging and operating the spring holder.

35. In a gang lawn mower, a lawn mower unit, an operating member for raising and lowering its cutter mechanism, a spring connected to the cutter mechanism, a pivoted spring holder arm, a stop in the path of said arm, and a flange carried by the operating member into and out of contact with the spring holder arm to move it from or toward stop engaging position.

36. In a gang lawn mower, a lawn mower unit, an operating member for raising and lowering its cutter mechanism, a spring connected to the cutter mechanism, a pivoted spring holder arm coaxial with said operating member, a stop in the path of said spring holder arm and a flange carried by the operating member into and out of contact with said spring holder arm to move it from or toward stop engaging position.

37. In a gang lawn mower, a gang of lawn mower units, a gang frame comprising frame members and a divided post member forming the connection between said members and a mower unit and located in a plane at right angles to the wheel axis of the unit and midway between its wheels, and unit adjusting mechanism located directly over said divided post member and occupying the space between the divided parts thereof.

38. In a gang lawn mower, a gang of lawn mower units, a gang frame comprising frame members and a divided post member forming the connection between said frame members and a mower unit, and a unit adjusting hand lever pivotally mounted for fore and aft movement in the space between the divided parts of said post member.

39. In a gang lawn mower, a gang of lawn mower units, a gang frame comprising frame members and a divided post member forming the connection between said members and a mower unit, a pair of spaced frame members each mounted on one of the divided parts of the post member and having an inner face substantially in vertical alignment with the inner face of the corresponding post part, and a unit adjusting hand lever pivoted on said post member between its divided parts for fore and aft movement between them.

40. In a gang lawn mower, a gang of lawn mower units having ground wheels, a gang frame formed of flexibly connected front and rear sections spacing said units, one of said

frame sections having closely spaced fore and aft frame members located in the central longitudinal planes of the respective units connected thereto, and cutter adjusting means comprising hand levers located respectively between and pivoted below the members of each pair of said frame members.

41. In a gang lawn mower, a gang of lawn mower units having ground wheels, a gang frame formed of front and rear flexibly connected sections, means for supporting said sections over the respective mower units including divided post members, said sections having closely spaced fore and aft frame members secured to the divided post members and located therewith in the central longitudinal planes of the respective units, and cutter adjusting means located between said frame members.

42. In a gang lawn mower, a gang of lawn mower units each having ground wheels, and a gang frame including two divergently located frame members whose remote ends are connected to different mower units between their ground wheels, a cross member intersecting the said members and secured thereto, and longitudinal framing connecting adjacent ends of said divergent frame members and cross member.

43. In a gang lawn mower, a gang of lawn mower units each having ground wheels and a gang frame including two divergently located frame members whose remote ends are connected to different mower units between their ground wheels, a cross member intersecting the said members and secured thereto, longitudinal framing connecting adjacent ends of said divergent frame members and cross member, and a central longitudinal tie bar connecting adjacent ends of said divergent frame members with the cross member.

44. In a gang lawn mower, a gang of lawn mower units each having ground wheels and a gang frame including two divergently located frame members whose remote ends are connected to different mower units between their ground wheels, a cross member intersecting the said members and secured thereto, pairs of closely spaced fore and aft frame members connecting adjacent ends of said divergent frame members and cross member, and cutter adjusting means mounted between said spaced frame members.

In testimony whereof, I have signed this specification.

CHARLES C. WORTHINGTON.



**Certificate of Correction.**

It is hereby certified that in Letters Patent No. 1,607,378, granted November 16, 1926, upon the application of Charles C. Worthington, of Dunnfield, New Jersey, for an improvement in "Gang Lawn Mowers," an error appears in the printed specification requiring correction as follows: Page 3, lines 79 and 80, claim 4, strike out the words "whose remote ends are connected to different mower units between their ground wheels" and insert the same to follow after the word "members", line 79, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of December, A. D. 1926.

[SEAL.]

M. J. MOORE,  
*Acting Commissioner of Patents.*

# EXHIBIT 3

April 12, 1938.

J. M. NOEL

2,114,096

MOWER

Original Filed Aug. 7, 1928 4 Sheets-Sheet 1

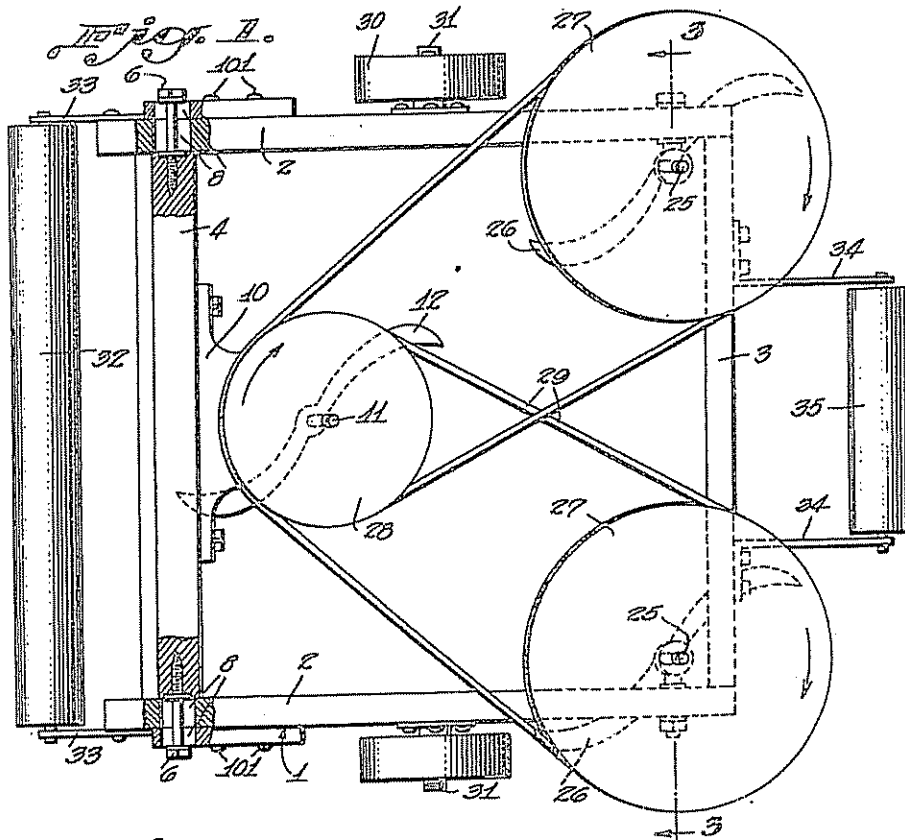
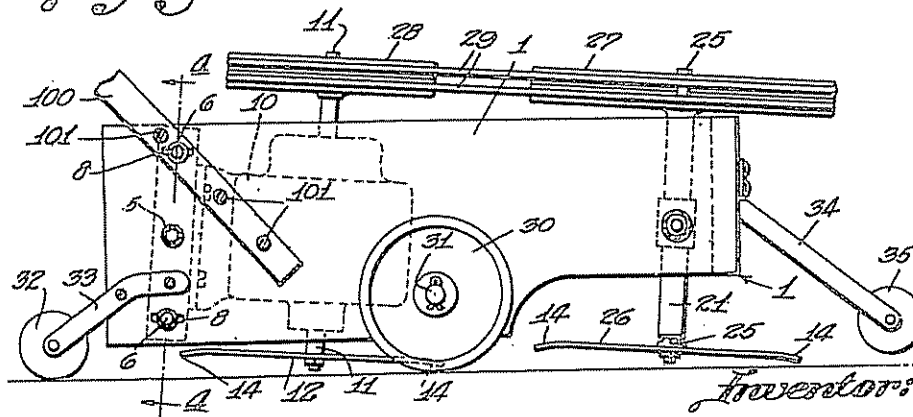


Fig. 2.



Inventor:  
Joseph M. Noel

April 12, 1938.

J. M. NOEL

2,114,096

MOWER

Original Filed Aug. 7, 1928 4 Sheets-Sheet 2

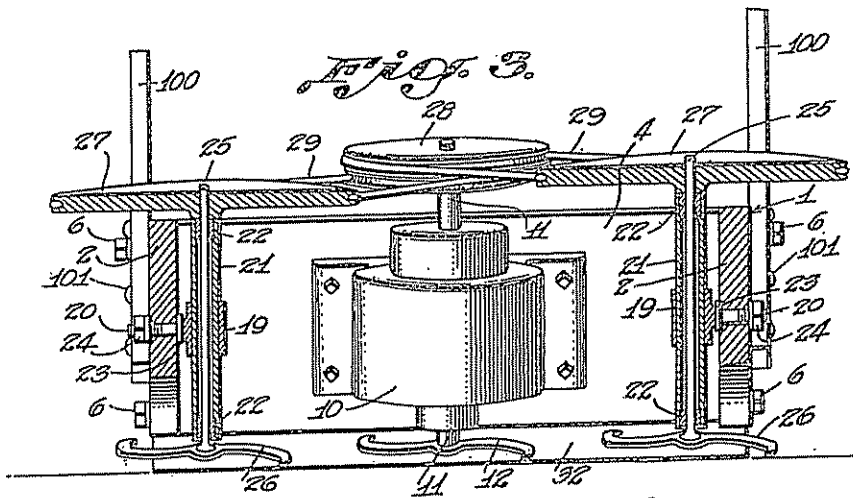


Fig. 4.

Fig. 2.

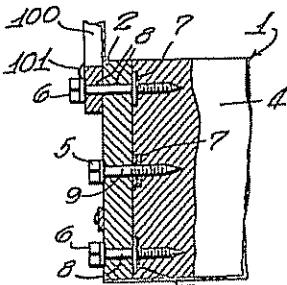


Fig. 5.

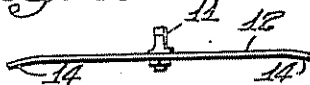
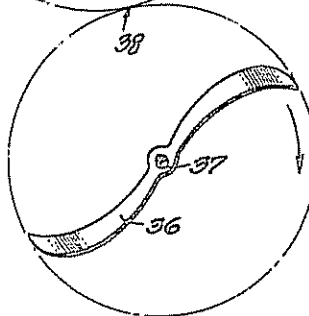
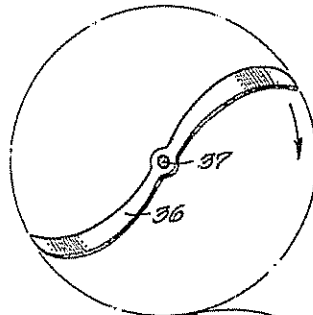
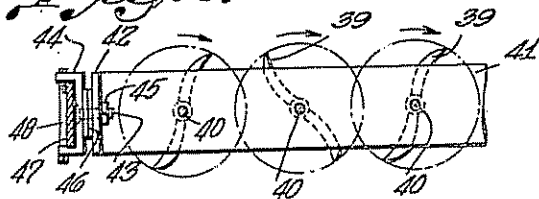


Fig. 6.



Fig. 8.



Inventor

Joseph M. Noel

April 12, 1938.

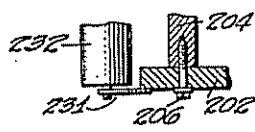
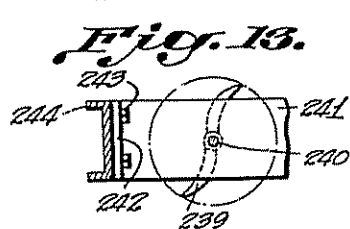
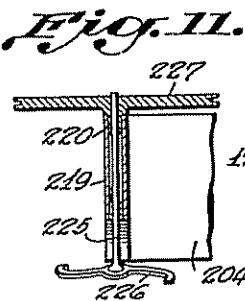
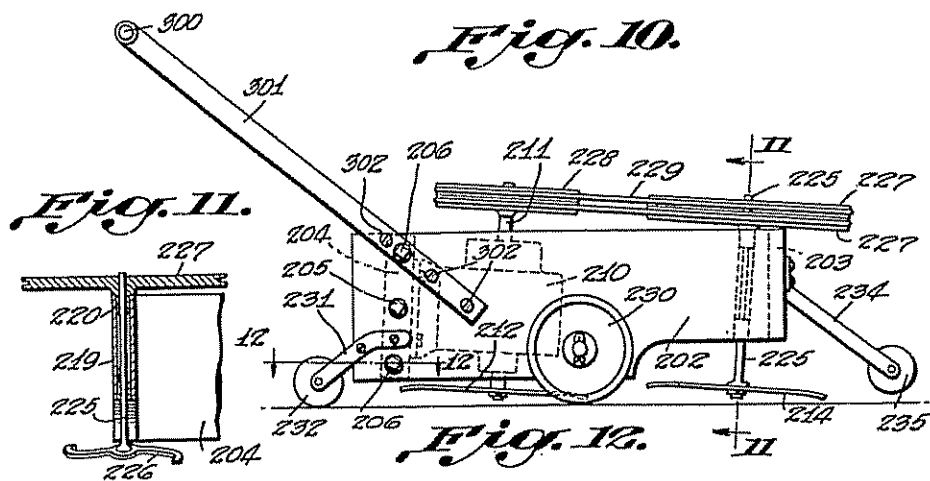
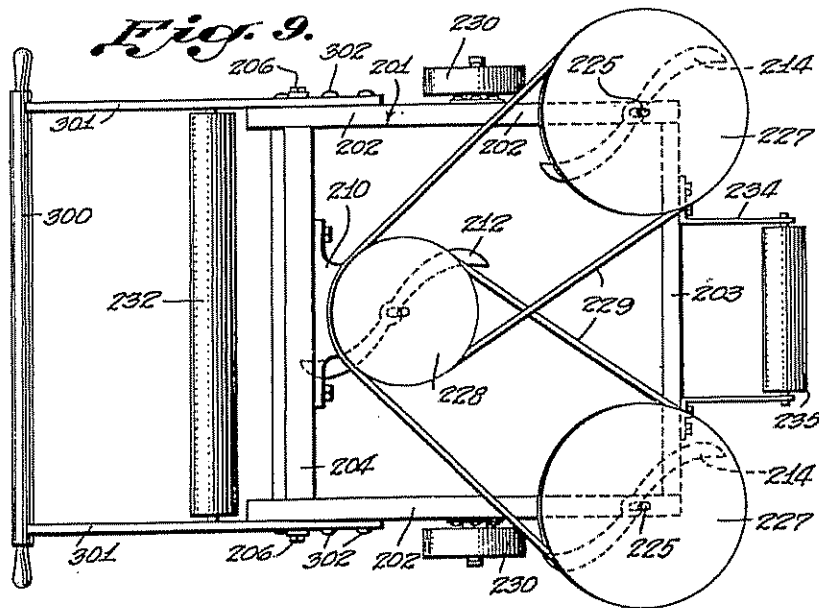
J. M. NOEL

2,114,096

MOWER

Original Filed Aug. 7, 1928

4 Sheets-Sheet 3



*Inventor:*

Joseph M. Noel

April 12, 1938.

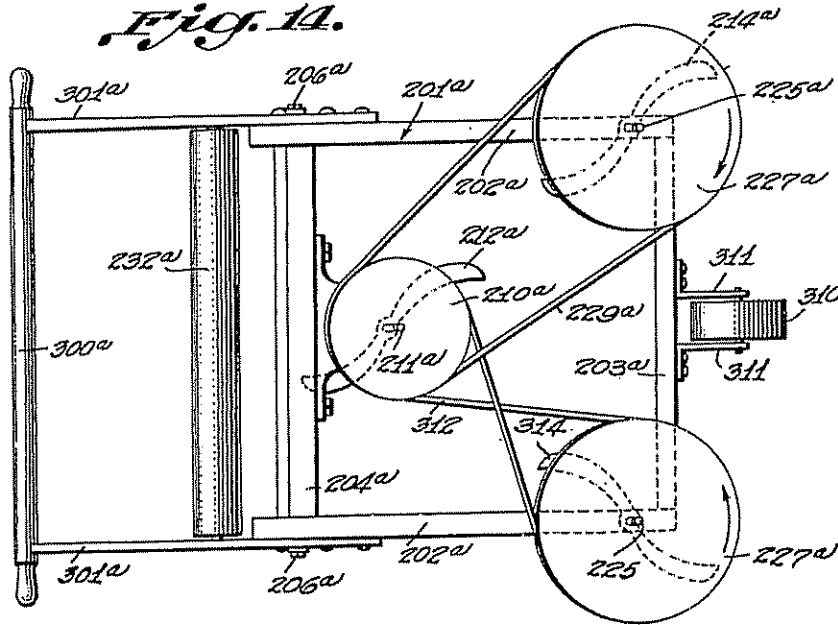
J. M. NOEL

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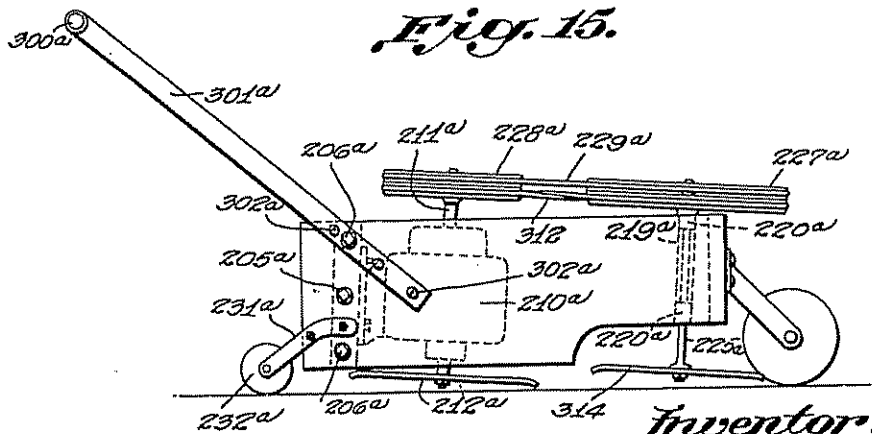
MOWER

Original Filed Aug. 7, 1928 4 Sheets-Sheet 4

*Fig. 14.*



*Fig. 15.*



*Inventor:*

*Joseph M. Noel*

Patented Apr. 12, 1938

2,114,096

## UNITED STATES PATENT OFFICE

2,114,096

MOWER

Joseph M. Noel, Cresson, Pa.; Elizabeth J. Noel,  
administratrix of said Joseph M. Noel, deceased,  
assignor to Harold A. Noel, Cresson, Pa.

Refiled for abandoned application Serial No.  
297,972, August 7, 1928. This application Au-  
gust 11, 1934, Serial No. 739,485

3 Claims. (Cl. 56—25)

This invention aims to provide a simple means for mowing grass and other crops, the structure being peculiarly adapted for use in a lawn mower, although it may be employed in any sort of a mowing machine.

One object of the invention is to provide novel means for adjusting the blades at any desired angle with respect to the soil. Another object of the invention is to provide a machine of the class described in which a plurality of rotary blades or cutters may be arranged in the same plane with respect to the surface of the soil. A further object of the invention is to provide novel means for supporting the forward end of the machine when the machine runs up an incline, so that the cutters will not dig into the surface of the incline.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings:—

Figure 1 shows in top plan, a device constructed in accordance with the invention;

Figure 2 is a side elevation;

Figure 3 is a cross section on the line 3—3 of Figure 1;

Figure 4 is a fragmental section taken approximately on the line 4—4 of Figure 2;

Figure 5 is an elevation showing one of the blades;

Figure 6 is an elevation showing a modified blade;

Figure 7 is a modification showing a different arrangement of the blades from that depicted in Figure 1;

Figure 8 is a fragmental plan showing how the invention may be used on an agricultural mower;

Figure 9 is a top plan showing a modified form of the invention;

Figure 10 is a side elevation of the structure disclosed in Figure 9;

Figure 11 is a section on the line 11—11 of Figure 10;

Figure 12 is a section on the line 12—12 of Figure 10;

Figure 13 is a section showing a modification;

Figure 14 is a top plan showing a modification;

Figure 15 is a side elevation showing the modification disclosed in Figure 14.

The numeral 1 marks a frame including side pieces 2, between which is fixed a front bar 3. A rear bar 4 is located between the side pieces 2 and although the rear bar 4 can be held in a fixed position, it is, nevertheless, adjustable about a horizontal axis represented by two oppositely disposed pivot elements, such as screws 5 threaded into the ends of the bar 4 and mounted to rock in openings 9 in the side pieces 2. Clamping devices are provided, the same preferably being in the form of screws 6 threaded into the ends of the rear bar 4 and movable in elongated slots 8 which are formed in the side pieces 2. Washers 7 are countersunk into the ends of the rear bar 4, and the pivot element 5 and the clamping screws 6 pass through the washers 7, the washers serving to strengthen the mounting of the elements 5 and 6 in the rear bar 4.

A prime mover of any desired kind, for instance, an electric motor 10, is secured to the rear bar 4 and lies within the contour of the frame 1. The shaft of the motor 10 is designated by the numeral 11, and to the lower end of it is secured a cutter 12, made up of oppositely disposed arms, shaped something like a scimitar. The arms of the cutter 12 may be downwardly inclined at their ends as shown at 14.

The numeral 100 marks the side bars of a handle by which the machine may be rolled along. The side bars 100 of the handle are connected by securing elements 101 with the side pieces 2 of the frame 1. The screws 6 pass through the bars 100 of the handle, and the slots 8, hereinbefore referred to, are located not only in the parts 2 of the frame 1, but in the handle bars 100, as well, this detail being shown in Figure 1 of the drawings.

Some prefer the arrangement shown in Figure 6, wherein the shaft is marked by the numeral 15, the cutter appearing at 16 and having a downwardly inclined end 17, and an upwardly inclined opposite end 18. The cutter 12 and the cutter 16, as well as the cutters 26 at the front of the machine (to be described hereinafter) may be called sweep-stroke cutters, to distinguish the cutters from a cylindrical cutter, like the cutter of an ordinary lawn mower, which turns on a substantially horizontal axis and does not operate with a sweeping cut.



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Brackets 19 are disposed inside of the frame 1, near to the forward end of the frame, and against the side pieces 2. The brackets 19 have stems 20 which extend outwardly through the side pieces 2. Tubes 21 are secured intermediate their ends in the brackets 19 and occupy a position that is about vertical. In the ends of the tubes 21, bearings 22 are secured. It may be convenient to designate the brackets 19 and parts carried thereby as "bearing devices". The brackets 19 have lateral shoulders 23 which abut against the inner surfaces of the side pieces 2, nuts 24 being threaded on the outer ends of the stems 20, the nuts cooperating with the outer surfaces of the side pieces 2. Shafts 25 are journaled for rotation in the bearings 22 and are provided at their lower ends with cutters 26, which may be constructed as hereinbefore described in connection with the cutters 12.

On the upper ends of the shafts 25, pulleys 27 are secured, and a pulley 28 is secured to the upper end of the shaft 11 of the motor 10. The pulley 28 has a double tread, in which are mounted belts 29 engaged about the pulleys 27. For the support of the frame 1, wheels 30 are journaled at 31 on the side pieces 2 and are disposed about midway between the front and back ends of the frame 1. A roller 32 is located behind the frame 1 and is journaled on supports 33 which are secured to the side pieces 2. There are downwardly inclined arms 34 on the front bar 3 of the frame 1, a roller 35 being journaled on the arms 34. The machine ordinarily is rolled about upon the roller 32 and the wheels 30, with the roller 35 in spaced relation to the surface of the ground, as shown in Figure 2.

By loosening the clamping screws 5, the rear bar 4 may be swung with respect to the vertical, on the pivot element 5, and when the clamping screws are tightened up, the rear bar 4 will be held in any position to which it may have been tilted. Owing to the fact that the bar 4 can be tilted and held, as aforesaid, the cutter 12 may be arranged at any desired angle with respect to the surface of the soil. As shown in Figure 2, the front portion of the cutter 12 is nearest to the soil, the cutter slanting rearwardly and upwardly.

This is desirable because it enables the cutter to clear the stubble readily, after the grass is out, and as the mower is moved forwardly. In order to adjust the cutters 26, so that they are inclined with respect to the surface of the ground, as indicated in connection with the cutter 12, the nuts 24 may be slacked away, the tubes tilted to the desired position, as shown in Figure 2, and the nuts tightened up, so as to bind the side pieces 2 between the nuts and the shoulders 23 (Figure 3).

The pulleys 27 are rotated from the motor 10 by means of the belts 29, and the shaft 11 of the motor rotates the cutter 12. The cutters 26 are spaced apart horizontally as shown in Figure 1, and each of the cutters 26 cuts its own swath. The strip of standing grass left between the cutters 26 is mowed down by the cutter 12. If desired, however, the cutter 12 may be omitted, recourse being had to the structure shown in Figure 7. Therein, the shafts 37 correspond to the shafts 25, and carry the cutters 36, these cutters corresponding to the front cutters 26 of Figure 1. The shafts 37 are so set, however, that, as shown at 38, there is no space between the swaths made by the cutters 36. As has been stated hereinbefore, the machine ordinarily rolls along on the

members 32 and 30, the roller 35 being out of contact with the ground, as seen in Figure 2.

When, however, an incline is encountered, the roller 35 moves along the incline and raises the forward end of the frame 1, so that the forward cutters 26 will not dig into the ground as they rotate.

The general idea shown in the drawings and hereinbefore described, may be embodied in an agricultural mowing machine of large capacity. Thus, in Figure 8, a plurality of cutters 39, of the kind hereinbefore described, are carried by shafts 40 which are journaled in a bearing bar 41 the upturned ends 42 of which are connected by stud bolts 43 with brackets 44, nuts 45 being threaded on the stud bolts and engaging the ends 42 of the bearing bar. Spaced washers 46 are interposed between the ends 42 of the bearing bar 4 and the brackets 44. A support 47 of any desired kind, on the machine, is held within the bracket 44, 20 at each end of the bar 41, by a securing device 48. The bar 41 can be raised and lowered and it can be tilted with respect to the horizontal and be held in tilted position by tightening up the nuts 45. In this way, the cutters 39 may be inclined, if desired, with respect to the surface of the soil, as shown in connection with the cutters 26 and 12 of Figure 2.

Referring to the form shown in Figures 9, 10, and 11, there is shown a frame 201 including side pieces 202 between which is located a front bar 203 and a rear bar 204. As has been stated hereinbefore, the bar 4 of Figure 1 is adjustable, with the screws 5 of Figure 2 as pivots, and with the screws 6 as clamping means. The rear bar 204 of Figures 9 and 10, is not adjustable, but is held securely in place by screws 205 and 206. The handle is shown at 300 and the side bars appear at 301. They are connected by securing elements 302, and by one of the screws 206, to the side pieces 202 of the frame 201.

An electric motor 210, or other prime mover, is secured to the rear bar 204, and is located within the frame 201. On the lower end of the shaft 211 of the motor 210 is mounted a cutter 212, of the kind hereinbefore described. Bores 219 are formed in the side pieces 202 of the frame 201, and bearings 220 are mounted in the bores 219. Shafts 225 are journaled in the bearings 220 and are supplied at their lower ends with cutters 214, which may be made as hereinbefore described in connection with the cutters 12.

Pulleys 227 are secured on the upper ends of the shafts 225, and a pulley 228 is secured to the upper end of the shaft 211 of the motor 210. Belts 229 are engaged about the pulleys 227, and about the pulley 228, the pulley 228 having a double tread. The supporting wheels 230 are mounted as hereinbefore described. The rear roller 232 is journaled on supports 231 mounted on the side pieces 202. The forward roller 235 is journaled on downwardly inclined arms 234, constructed like the arms 34 of Figure 2.

The operation of the device is practically the same as the operation of the structure shown in Figures 1 and 2, aside from the fact that the cutters 212 and 214 are not adjustable with respect to the surface of the soil.

In the form shown in Figures 9 and 10, as in the other forms, the device comprises a frame, a sweep-stroke cutter, means for mounting the cutter for rotation on the frame with the cutter disposed in a downwardly and forwardly slanting plane, thereby permitting the cutter to clear the



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stubble readily as the frame is moved forwardly, and means for rotating the cutter.

The modification shown in Figure 13 relates to the form shown in Figure 8. The cutters 239 are carried by vertical shafts 240 journaled in a bearing bar 241, the upturned ends 242 of which are connected by bolts 243 with channel bars 244.

In the modified form shown in Figures 14 and 15, parts hereinbefore described in connection with Figures 9-10-11-12 have been designated by numerals formerly used, with the suffix "a".

In the form shown in Figures 14 and 15, the wheels 230 of Figures 9 and 10 have been omitted. The forward wheel 310 is considerably narrower than the wheel 235, and the arms 311 are closer together than the arms 234. The belt 312 that connects the pulley 210a with one of the pulleys 227a is crossed, and the curvature of the corresponding cutter 314 is reversed as compared with the opposite cutter 214a. The cutters 314 and 214a rotate in opposite directions, and all of the grass is thrown toward the center of the machine, a scattering of the grass thus being avoided.

What is claimed is:

1. The combination with a wheel supported frame, of a pair of laterally spaced upright shafts at the forward part of the frame, a third upright shaft to the rear of the front shafts, cutters on said shafts, said shafts being supported revolvably on the frame, the rearwardly cutter shaft being positioned on a line which is located

substantially at right angles to a line connecting the forwardly pair of cutter shafts and which substantially bisects this line, and means for rotating the shafts whereby the cutters may be operated.

2. The combination with a wheel supported frame, of a pair of laterally spaced upright shafts at the forward part of the frame, a third upright shaft to the rear of the front shafts, cutters on said shafts, said shafts being supported revolvably on the frame, the rearwardly cutter shaft being positioned on a line which is located substantially at right angles to a line connecting the forwardly pair of cutter shafts and which substantially bisects this line, and means for rotating the third shaft and means for connecting the third shaft with the other shafts whereby the cutters may be operated.

3. The combination with a wheel supported frame, of a pair of laterally spaced upright shafts at the forward part of the frame, a third upright shaft to the rear of the front shafts, cutters on said shafts, said shafts being supported revolvably on the frame, the rearwardly cutter shaft being positioned on a line which is located substantially at right angles to a line connecting the forwardly pair of cutter shafts and which substantially bisects this line, and means for turning said shafts whereby the cutters may be operated, the said forward cutters projecting laterally of, and outwardly from the frame.

JOSEPH M. NOEL.

# EXHIBIT 4

# Rotaries take to golf courses

*Improved cut and easy maintenance have helped rotary mowers gain wider acceptance on golf courses. Small rotaries can go where reel mowers fear to tread.*

By Dave Buchanan, Jacobsen Division of Textron

Larry Della Bianca got an unexpected bonus when he took delivery of his new rough mower—his fairways improved.

Shortly after the new rotary mower came to Pine Valley Golf Club in Southington, Conn., where Della Bianca is superintendent, repeat customers began complimenting him on the great shape of the fairways. He hadn't

changed any of his fairway maintenance practices, so he was at a loss to explain their sudden improvement.

"Finally, I was up at the clubhouse, looking out at the first fairway," Della Bianca recalls. "One of my people had just mowed the rough (with the new mower) and then it dawned on me. Because of the fine cut and the grass standing up, it gave a striping effect that was so distinctive, the rough stood out from the fairway and made it look better. It was accenting the fairway."

The new mower that gave Della Bianca such a fine cut and distinctive striping wasn't a traditional reel mower. It was a rotary mower. At courses across the country, rotaries are gaining acceptance as good tools for certain applications.

The vacuum action rotary cutting decks create and the equipment's relatively light weight have helped make them more popular.

"The main reason I like using them is their ability to really stand the grass up as they cut," says Mike Sauls, superintendent at Butler National Golf Club, Oak Brook, Ill. "With cart traffic driving down the rough, we've had a tendency to have the grass lay down. The rotary makes the grass stand up for denser growth."

Pine Valley's Della Bianca now uses both a large dedicated rotary mower and two riding rotaries with front-mounted decks to cut his roughs. He had used a 7-gang mower for that job.

"Before, when conditions were wet, I could not get the cut I was looking for," he says. "Now, I can go out there when it's wet or when it's dry. In fact,

two of my 18 roughs are extremely wet, and the way the HR-15—that's the large rotary—floats over them, I can cut them when they're wet without tracking."

Maneuverability is another plus for rotary mowers. Although they aren't as productive as gang mowers due to the limited cutting deck size, riding mowers with rotary decks can run rings around obstacles and sneak into tight spots with ease.

"In roughs, we use gang mowers and rotaries," says David Denley, superintendent at Lochinvar Golf Club, Houston, Texas. "Our course has a lot of pine trees, and we use a tractor with a 72-inch deck to get close to and in between them without damaging the trees."

Crews use gangs and rotaries in combination to maintain the roughs at Delaire Country Club, part of a development community in Del Ray Beach, Fla. Superintendent Ray Hansen uses riding rotaries with rear-discharge decks to trim along property lines that separate the course from the homes built along it.

"In most cases, we can get right up to the edge of the property line with a gang mower," Hansen says. "Where that's not possible, where there are trees, we use the rotaries and string trimmers. We mulch and spray around the trees to reduce the amount of work we have to do with trimmers. That way, the rotaries can handle most of it."

Although most superintendents restrict rotary use solely to roughs, it's not unusual to find rotaries doing trim work around greens.

"I can mow the greens' banks (with

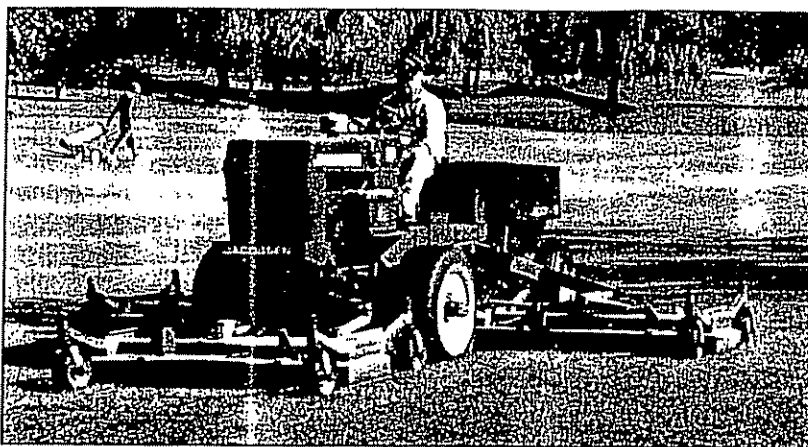
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Riding rotary mowers are highly maneuverable, making them ideal for cutting around trees and other obstacles

## Rotaries on golf courses

(Continued from page 58)



Large, dedicated rotary mowers give maximum productivity. They are best for large areas with few obstacles.

a rotary) three times a week and still stay within my mowing schedule," says Don Cook, superintendent at Milburn Country Club in Overland Park, Kan. "And I can cut my grass a little higher because we're cutting it so often. It looks neat and the grass is healthier because we're cutting it at 2½ or 3 inches instead of something shorter with a reel mower."

### Selecting a rotary

A variety of rotaries can be useful on a golf course. Selecting the right one depends on course conditions and personal preference.

So-called dedicated mowers (large tractors used solely to cut turf) give maximum productivity. They are best suited for courses with wide, open roughs and few trees. Dedicated mowers deliver a clean cut in roughs, and not just to the turf. According to Della Bianca, small branches, leaves, pine cones and other debris that tend to clutter up roughs disappear under the rotary's blades.

"You can run over that stuff, grind it right up, shoot it out the discharge and leave no traces of it at all. It gives a clean cut," he says.

For productivity with maneuverability, use a riding rotary mower with a front-mounted deck. A 72-inch cutting width is the most popular, but decks from 44- to 88-inches wide are available.

When choosing a cutting deck, consider your site's contours and landscaping features. If the area has distinct undulations, a larger deck's greater productivity will be negated by its in-

ability to follow contours.

"At one time, we had a 72-inch deck that was too big for most of the areas we were using it in," says Tom Alex, superintendent at Grand Cypress Golf Club in Orlando, Fla. "We went down to a 60-inch deck and many of our scalping problems went away. If your gauge wheels are set okay and you've got the right deck for the area, scalping usually isn't a problem."

If you plan to use the mower in tight spots, make sure the cutting deck is small enough. If the machine *just fits*, you are depending on the operator to slow down and move through certain areas exactly correctly. In the real world, you are probably asking for several collisions that may damage both the machine and the landscape, not to mention the operator.

Rear-wheel and power steering make riding rotaries highly maneuverable. Look into 4-wheel drive if your course has hilly terrain.

Flexibility is another riding rotary advantage. It will probably mow most of the time, but attachments are available to blow leaves and clippings, throw snow, sweep with a rotary brush and accomplish a number of other jobs.

Labor-intensive walk-behind rotary mowers are less prevalent at golf courses, but they do have their place. Butler National uses 36-inch rotaries on some greens' banks.

Small walk-behind rotaries are in use at the prestigious Sherwood Country Club in Thousand Oaks, Calif., where the clientele includes former President Ronald Reagan, major sports celebrities, leaders of major corporations and

stars of the motion picture industry. There is pressure on superintendent Rich Wagner to provide exceptional conditions, right down to the last clipping.

"We're using commercial walk-behind rotary mowers for trim work and walk-behinds with bags for our primary roughs around the greens," Wagner says. "It's extremely labor intensive, but our players expect first-class conditions. They don't want any grass lying around the greens. In fact, they don't want any grass lying around the golf course."

Wagner says he has 10 rotaries cutting about 5 acres of low spots and tee complexes three times a week. The job usually takes all day.

### Rotaries require training

"Like any piece of equipment, the operator has to know how to use it," says Milburn Country Club's Don Cook. "Once they get used to it, they're usually very good at it."

Use your experienced workers to train new operators. Have them explain how to avoid scalping and which parts of the course are off limits to rotaries. Your trainers should know how to explain the steps involved in providing the finished look you want.

"There's definitely an operator technique to it," says Butler National's Mike Sauls about using a rotary. "We've got three fellows who have been doing their rotary mowing for about 8 years now. We usually have one of them work closely with a new person the first couple of times. We explain what we're trying to accomplish and what look we want. We like a little striping around the banks, but we don't want grass in the bunkers around the greens. We explain the aesthetic appearance we're looking for."

At Muirfield Village Golf Club in Dublin, Ohio, new operator training involves more than learning the course. Superintendent Mike McBride wants his new people also to understand the machines they'll be using.

"Everyone goes through a training course where a supervisor, a foreman, the service manager or a combination of the three, will go through a machine thoroughly," McBride says. "We do this not only to show them how it operates, but also the daily maintenance they have to do before they take it out, and what

Continued



## Rotaries on golf courses

(Continued from page 60)

they do with it when they bring it back in. We also show them the limitations of that machine—where they can go, where they can't go—so they don't get in trouble, mainly from a safety point of view."

McBride says the training process usually takes a couple of days.

### Maintenance ease

With 400 acres of prime Florida real estate to tend, Grand Cypress's Tom Alex and his crew know the importance of good equipment maintenance. Two out-front rotary mowers cut 30 to 40 of those acres. They are in use up to 4 days a week.

"Each time they're used, our mechanics will go through and perform any daily maintenance that's needed," Alex says. "That includes greasing, checking the spindles and then sharpening the blades."

That kind of daily maintenance is essential for a machine to deliver peak performance and long service life. John Oldenburg, service manager for Jacob-

sen Textron, recommends checking the equipment's vital fluids daily.

"The engine oil and hydraulic fluid should be checked and the cutting deck greased, without fail, every day," Oldenburg says. "The deck should be cleaned daily and the radiator should be checked every day to make sure it's clear. Rotaries blow more dry debris into the air than reels. Debris can get into the engine compartment and clog things. That will reduce its efficiency, and could eventually cause overheating."

Oldenburg recommends using an air hose to clean radiators and cooling fins. He says cleaning with water can pack dust and dirt into openings between fins and clog them.

In addition to cleaning and greasing decks daily, sharpen blades regularly and maintain proper balance. Simple, inexpensive devices are available to check blade balance. An unbalanced blade can cause vibration that may contribute to premature bearing failure and structural damage.

Examine mechanical decks for loose

or worn belts. If your machine has hydraulic decks, regularly check hoses and fittings for wear or leakage. A worn, damaged or leaking component is a warning signal that a more serious problem is in the making. Address these warning signals immediately before a more serious problem occurs that could damage the turf or put the equipment out of commission.

Assign one person to do these preventive maintenance chores. Along with the daily checks, make that person responsible for keeping track of oil, fluid and filter changes.

The responsibility for keeping equipment running properly doesn't have to rest solely on the mechanic's shoulders, Oldenburg says. Operators can help by reporting any machine problems. That should start even before the operator climbs aboard in the morning.

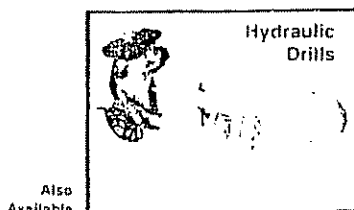
"A quick visual inspection of the machine every morning before it goes out can save a lot of headaches," Oldenburg says. □

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